BOOK REVIEWS.

A History of Japanese Mathematics. By DAVID EUGENE SMITH and YOSHIO MIKAMI. The Open Court Publishing Company, Chicago, 1914. vii + 288 pages. $3.50.

This book is a beautiful specimen of the printer's art. The paper, the type, and the illustrations make it a work which it is a delight to read almost aside from the text. I hasten to add that text and content are in harmony with the dress. The sympathetic portrayal of the development of Japanese mathematics, largely indigenous and as the authors well state, "like her art, exquisite rather than grand," will appeal to a wide circle of readers and will contribute to a juster and broader appreciation of the Japanese genius.

The history of Japanese mathematics is divided into six periods. The first extends to 552 A. D. and was almost entirely a native development. The second period, from 552 to 1600, was characterized by the predominance of Chinese mathematics. The third period was a kind of Renaissance culminating in the appearance of Seki, the most famous Japanese mathematician. The fourth period, 1675 to 1775, and the fifth, 1775 to 1868, are marked by the complete development of the native mathematics, the *wasan,* in the second of these two periods somewhat influenced by European mathematics. The sixth is the period of the present, the mathematics of the world which knows nothing of political and racial boundaries.

The earliest and second periods are treated in 17 pages which is significant of the fact that little is known definitely of the history of these times. The development of the *soroban* from the Chinese *swan-p'an* and the methods of operating with this instrument are given in a detailed and satisfactory manner. Incidentally it seems worthy of note that *swan-p'an* with the meaning in Chinese of "reckoning table" corresponds to the Greek word from which we have "abacus," also having the meaning "table," particularly for bankers. The "sangi" or numeral rods, another type of palpable arithmetic, are explained both as used for representing numbers and also as applied to algebra. Numerical approximation of the roots of equations, especially in connection with the circle, made a particular appeal to the Japanese as well as to the Chinese. Magic squares and even magic circles received much attention in the third period. Three chapters are given over to Seki Kōwa, 1642–1708, and his pupils, including an extended discussion of the "yenri" or circle principle, an approach to the methods of the calculus. The remaining six chapters are devoted respectively to the eighteenth century, Ajima Chokuyen, the opening of the nineteenth century, Wada Nei, the close of the old Wasan, and the introduction of occidental mathematics. An index and vocabulary add to the usefulness of the work.

The typographical errors and other slips which I have noted are few in number and unimportant: p. 15 "compotus rolls," probably better "computus rolls"; p. 19, n. 6, "I" for "we"; p. 29, "aboud"; p. 31, "nstrument"; p. 51, "Latin *res* and the Italian *cosa,* both of which had undoubtedly come from the

East," but we know that these are direct translations from the Arabic *shai*, meaning *thing*; p. 51, n. 4, Egyptian *hau* should be *ahau* for *heap;* p. 80, "Arabic numerals," elsewhere "Hindu-Arabic numerals"; p. 279, "develpoed."

In every way this work can be commended to the student of the history of science and to the student of Japanese civilization, and quite as much to the general reader, for the greater part of the story is not at all technical. May this beautiful product of a German printer, W. Drugulin, Leipzig, put out by an American publishing house, the joint work of a Japanese and an American, be symbolical of a better mutual understanding between these countries.

L. C. KARPINSKI.

The Development of Mathematics in China and Japan; Abhandlungen zur Geschichte der mathematischen Wissenschaften, Vol. XXX. By YOSHIO MIKAMI. Teubner, Leipzig, 1913. G. E. Stechert and Co., New York. x + 347 pages. $5.50 net.

In 1910 Mr. Mikami published in the same series as this volume the work, *Mathematical Papers from the Far East,* which attracted favorable attention. The present work is of great importance because it brings systematized information about the history of mathematics in China and Japan, based upon a study of such original documents as remain. Regret must be expressed that the book is marred, even as the preceding work, by faulty English. The prefatory note by G. B. Halsted implies that the task of correcting the English was entrusted to him, but instead of correcting he says: "This is not the idiom of England nor of the United States nor have I striven so to cramp it." I take it that Mr. Mikami desired to bring out the work in idiomatic English and censure for the many errors of construction as well as the actually unintelligible statements can be attached only to the American scholar to whom the revision was entrusted. I think it is also fair to say that no American publishing house would bring out a work in the German language with such faults in usage, spelling, and construction as disfigure the work under consideration. The reviewer makes no attempt to list these errors.

There is no better evidence of the uncertainty which attaches to the ancient mathematics of China than the fact that Mr. Mikami's description of the *Arithmetic in Nine Sections* is entirely different (footnote, p. 10) from the description given by T. Hayashi in his *Brief History of Japanese Mathematics* (Nieuw Archief, Tweede Reeks, Deel VI, 306–307, not accessible to me). However this uncertainty is also characteristic of the history of ancient Hindu mathematics.

One of the most striking chapters of the work (Chap. IV) deals with *The Arithmetical Classic of Sun-Tsu.* The operations of multiplication and division and extraction of square root correspond almost precisely, mechanically, to these operations as taught in the early treatises explaining the Hindu art of reckoning. Thus in multiplication the unit of the lower number is placed below the highest digit of the upper number and the highest digit of the upper number is then multiplied by the lower number, the product being arranged in a line between the